

# **intreXis<sup>®</sup>**

**Power Supplies with the** 



## **Datasheet**

### **intreXis Boardnet Converter Platform IC27X, 50 – 60 W Single-Output 24 Vin – 110 Vin**

-  **tra wide input voltage range: 14.4 – 154 VDC**
-  **tra high efficiency: 91.9 % @ 110 Vin, 50 W**
-  **tra wide temperature range: -50 – 85 °C**
-  **tra small and light: 98 g (open frame)**
-  **tra flat: 22.1 mm total mounting height (open frame)**

This datasheet covers the details of the IC27X power supplies with single output voltage and output power of 50 W. In addition, the IC273\_X can deliver 60 W over the input voltage range 72 – 110 V. These DC/DC converters are designed according to EN 50155:2021 and IEC 60571:2012 for railway applications and are ideal for other demanding environments which require the highest performance and reliability.

Output voltages: 12 V, 15 V, 24 V. Other voltages on request.

Ordering codes:

IC271\_2, IC272\_2, IC273\_2 (open frame, with push-in connectors)

IC271\_3, IC272\_3, IC273\_3 (standard Chassis Mount, with terminal block headers)

IC271\_7, IC272\_7, IC273\_7 (open frame, PCB Mount)

IC271\_8, IC272\_8, IC273\_8 (DIN-rail Mount, with terminal block headers)

The differences between the variants are explained in this datasheet.

## INPUT CHARACTERISTICS

|                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                |               |               |             |
|----------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|---------------|-------------|
| Continuous Input Voltage Range                                                                                       | 16.8 – 154 VDC                                                                                                                                                                                                                                                                                                                                                                                                                                                 |               |               |             |
| Temporary Input Voltage Range<br>according to EN 50155:2021, 5.2.3                                                   | 14.4 – 154 VDC for 1.0 sec                                                                                                                                                                                                                                                                                                                                                                                                                                     |               |               |             |
| Input Undervoltage Lockout                                                                                           | Vin_OFF = 13.2 VDC ±2 %<br>Vin_ON = 15.5 VDC ±2 %.                                                                                                                                                                                                                                                                                                                                                                                                             |               |               |             |
| Input Voltage Reverse Polarity Protection                                                                            | Active reverse polarity protection:<br>lin_reverse < 500 µA @ Vin = -154 VDC<br>(with reverse polarity of Vin, the converter remains off without being damaged. Only a small reverse current lin_reverse flows.<br>With correct polarity of Vin, the converter works correctly)                                                                                                                                                                                |               |               |             |
| Inrush Current<br>over the entire operating temperature range                                                        | An active inrush limitation circuit limits the input inrush current after turn-on of the input voltage. The charging current into EMI suppression capacitors is disregarded during the first microseconds after switch-on.<br><br>Inrush Current Energy over the entire input voltage range:<br>$I_{inrush}^2t < 0.6 \text{ A}^2\text{s}$ @ Vin=16.8 – 137.5 VDC<br><br>Inrush Current Peak = 2.4 A typ. @ 24 Vin<br>Inrush Current Peak = 11 A typ. @ 110 Vin |               |               |             |
| Input Capacitance                                                                                                    | 190 µF                                                                                                                                                                                                                                                                                                                                                                                                                                                         |               |               |             |
| Input Current typ. @ full Load (50 W)                                                                                | 24 Vin                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 36 Vin        | 72 Vin        | 110 Vin     |
|                                                                                                                      | 2.3 A                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 1.5 A         | 0.75 A        | 0.49 A      |
| Input Current typ. @ 60 W (IC273_X only)                                                                             | 24 Vin                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 36 Vin        | 72 Vin        | 110 Vin     |
|                                                                                                                      | 2.7 A                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 1.8 A         | 0.90 A        | 0.59 A      |
| Input Power typ. @ no Load<br>over the input voltage range                                                           | IC271_X                                                                                                                                                                                                                                                                                                                                                                                                                                                        | IC272_X       | IC273_X       |             |
|                                                                                                                      | 0.38 – 0.52 W                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 0.41 – 0.56 W | 0.50 – 0.67 W |             |
| Internal Input Fuse                                                                                                  | Fuse included, therefore no external fuse or circuit breaker required. If you, nevertheless, install an external circuit breaker for any other reason, please select it according to the recommendation below.<br>$I^2t_{\text{fuse}} = 97.5 \text{ A}^2\text{s}$                                                                                                                                                                                              |               |               |             |
| External Circuit Breaker recommendation<br>Important: Circuit Breaker must be rated for the maximum DC-input voltage | 24 Vin                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 36 Vin        | 72 Vin        | 110 Vin     |
|                                                                                                                      | 5 A, type B                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 3 A, type B   | 2 A, type B   | 2 A, type B |
| Interruptions of Input Voltage Supply<br>(Hold-up time)                                                              | Class S2 (10 ms) according to EN 50155:2021<br>The converter continues to operate as intended during and after the interruption, with no degradation of performance or loss of function over the entire input voltage range (Performance criterion A).                                                                                                                                                                                                         |               |               |             |
| Startup time<br>(Time input voltage ON to output voltage ON)                                                         | < 200 ms for all input voltages                                                                                                                                                                                                                                                                                                                                                                                                                                |               |               |             |

## OUTPUT CHARACTERISTICS

| Output Voltage Nominal                                                                                                                                              | IC271_X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | IC272_X       | IC273_X                                               |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|-------------------------------------------------------|
|                                                                                                                                                                     | +12.0 VDC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | +15.0 VDC     | +24.0 VDC                                             |
| Max. Continuous Output Power<br>@ $V_{in} = 16.8\text{--}154\text{ V}$ , $14.4\text{--}154\text{ V}$ for 1.0 sec<br>(no derating over the entire temperature range) | 50 W                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |               |                                                       |
| Max. Continuous Output Power<br>@ $V_{in} = 50.4\text{--}154\text{ V}$ , $43.2\text{--}154\text{ V}$ for 1.0 sec<br>(no derating over the entire temperature range) | Only IC273_X: 60 W                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |               |                                                       |
| Minimum Load                                                                                                                                                        | No minimum load required.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |               |                                                       |
| Setpoint Accuracy                                                                                                                                                   | < 1.0 %                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |               |                                                       |
| Load Regulation<br>@ off-load to full load over the entire<br>temperature range                                                                                     | IC271_X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | IC272_X       | IC273_X                                               |
|                                                                                                                                                                     | < 0.4 %                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | < 0.4 %       | < 0.2 %                                               |
| Line Regulation<br>@ full load over the entire temperature range                                                                                                    | < 0.1 %                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |               |                                                       |
| Output Ripple & Noise<br>@ 20 MHz bandwidth, including spikes                                                                                                       | < 50 mVpp @ $-25\text{--}+85\text{ }^{\circ}\text{C}$<br>< 100 mVpp @ $-50\text{--}-25\text{ }^{\circ}\text{C}$                                                                                                                                                                                                                                                                                                                                                                                                                                     |               |                                                       |
| Overload and Short-Circuit                                                                                                                                          | <p>The converter is continuous overload and short-circuit proof.</p> <p><b>Output overloaded:</b><br/>The output voltage is reduced and the output current limited (constant current).</p> <p><b>Output short-circuited:</b><br/>The converter goes into Hiccup-Mode:<br/>The converter switches off and tries periodically to switch on again. If the short-circuit is still present, the converter switches off again and tries again periodically. If the short-circuit is removed, the converter switches on at the next switch-on attempt.</p> |               |                                                       |
| Current Limit<br>(varies due to component tolerances)                                                                                                               | IC271_X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | IC272_X       | IC273_X                                               |
|                                                                                                                                                                     | 4.35 – 5.21 A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 3.50 – 4.17 A | 2.19 – 2.65 A<br>@ $V_{in} = 24\text{--}48\text{ V}$  |
|                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |               | 2.63 – 3.13 A<br>@ $V_{in} = 72\text{--}110\text{ V}$ |
| Short-Circuit current                                                                                                                                               | < 4.0 Arms                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | < 3.0 Arms    | < 2.0 Arms                                            |
| Overvoltage Protection (OVP)<br>(output voltage is limited, if main regulation<br>loop fails)                                                                       | < 16 VDC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | < 20 VDC      | < 31 VDC                                              |
|                                                                                                                                                                     | SELV-compliant according to<br>EN 60950-1:2006+A2:2013,<br>IEC 60950-1:2005+A1:2009+A2:2013 CSV                                                                                                                                                                                                                                                                                                                                                                                                                                                     |               |                                                       |
| Paralleling of Outputs                                                                                                                                              | Paralleling can be optionally included.<br>Please contact intreXis for advice                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |               |                                                       |
| Internal Decoupling Diode                                                                                                                                           | Decoupling diode on the output can be optionally included.<br>Please contact intreXis for advice                                                                                                                                                                                                                                                                                                                                                                                                                                                    |               |                                                       |
| Maximum load-capacitance                                                                                                                                            | 5000 $\mu\text{F}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |               |                                                       |

## EFFICIENCY

### IC271\_X:

| Conditions                   | 24 Vin | 36 Vin | 72 Vin | 110 Vin |
|------------------------------|--------|--------|--------|---------|
| Efficiency typ. @ 100 % Load | 91.6 % | 92.9 % | 92.8 % | 91.9 %  |
| Efficiency typ. @ 66 % Load  | 92.7 % | 92.9 % | 92.9 % | 91.5 %  |
| Efficiency typ. @ 33 % Load  | 91.9 % | 91.5 % | 91.0 % | 90.5 %  |

### IC272\_X:

| Conditions                   | 24 Vin | 36 Vin | 72 Vin | 110 Vin |
|------------------------------|--------|--------|--------|---------|
| Efficiency typ. @ 100 % Load | 91.3 % | 92.8 % | 92.7 % | 91.8 %  |
| Efficiency typ. @ 66 % Load  | 92.5 % | 92.7 % | 92.9 % | 91.3 %  |
| Efficiency typ. @ 33 % Load  | 91.8 % | 91.3 % | 90.3 % | 90.0 %  |

### IC273\_X:

| Conditions                   | 24 Vin | 36 Vin | 72 Vin | 110 Vin |
|------------------------------|--------|--------|--------|---------|
| Efficiency typ. @ 100 % Load | 91.4 % | 92.8 % | 92.6 % | 91.7 %  |
| Efficiency typ. @ 66 % Load  | 92.4 % | 92.5 % | 92.9 % | 90.2 %  |
| Efficiency typ. @ 33 % Load  | 91.4 % | 91.0 % | 88.8 % | 88.5 %  |

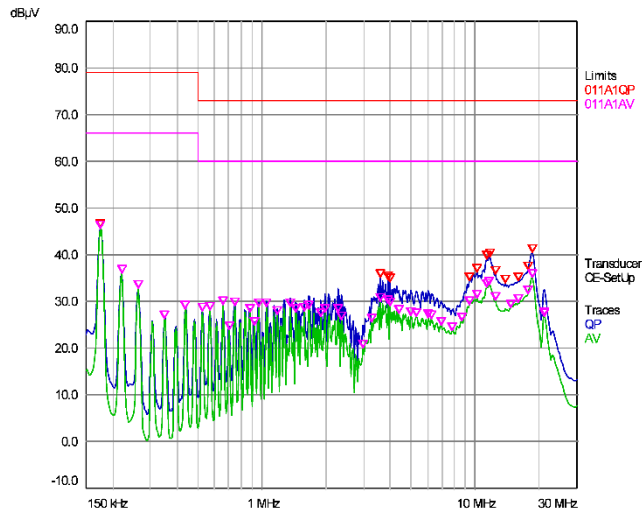
## SIGNALS AND INTERFACES

|     |                                                              |
|-----|--------------------------------------------------------------|
| LED | Green LED on output side indicates that output voltage is ok |
|-----|--------------------------------------------------------------|

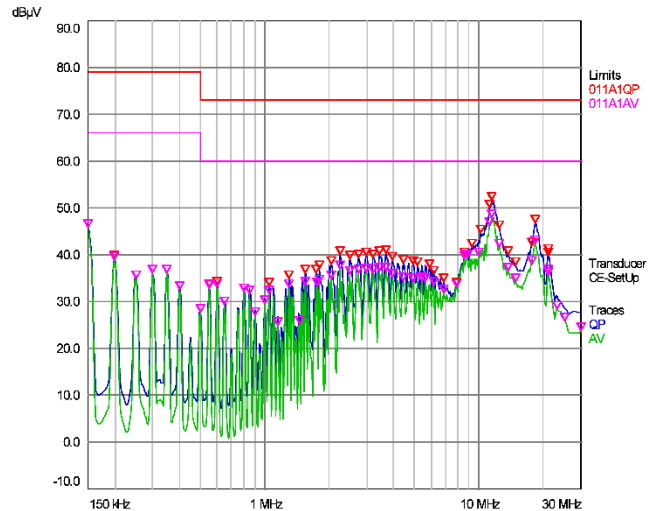
## ELECTROMAGNETIC COMPATIBILITY (EMC)

| Test                                  | Standard                                                                                  | Test severity levels                                                                                                                                                                                                                                                                                                       | Performance Criteria                                                   |
|---------------------------------------|-------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|
| Surges                                | EN 50155:2021<br>EN 50121-3-2:2016/<br>A1:2019<br><br>IEC60571:2012<br>IEC 62236-3-2:2018 | 1.2/50 $\mu$ s<br>42 $\Omega$ , 0.5 $\mu$ F<br>DC power supply port<br>$\pm$ 2 kV line to ground<br>$\pm$ 1 kV line to line                                                                                                                                                                                                | Criterion B required,<br>but compliant with<br>more strict criterion A |
| Electrostatic discharge               | EN 50155:2021<br>EN 50121-3-2:2016/<br>A1:2019<br><br>IEC60571:2012<br>IEC 62236-3-2:2018 | $\pm$ 6 kV contact discharge<br>$\pm$ 8 kV air discharge                                                                                                                                                                                                                                                                   | Criterion B required,<br>but compliant with<br>more strict criterion A |
| Fast transients                       | EN 50155:2021<br>EN 50121-3-2:2016/<br>A1:2019<br><br>IEC60571:2012<br>IEC 62236-3-2:2018 | $\pm$ 2 kV<br>5/50 ns tr/th<br>5 kHz repetition frequency                                                                                                                                                                                                                                                                  | Criterion A                                                            |
| Radio-frequency common mode           | EN 50155:2021<br>EN 50121-3-2:2016/<br>A1:2019<br><br>IEC60571:2012<br>IEC 62236-3-2:2018 | 150 kHz – 80 MHz<br>10 Vrms (carrier voltage)<br>80 % AM, 1 kHz<br>Source impedance 150 $\Omega$                                                                                                                                                                                                                           | Criterion A                                                            |
| Radio-frequency electromagnetic field | EN 50155:2021<br>EN 50121-3-2:2016/<br>A1:2019<br><br>IEC60571:2012<br>IEC 62236-3-2:2018 | 80 MHz – 1000 MHz<br>20 Vrms/m<br>80 % AM, 1 kHz<br>unmodulated carrier;<br><br>1400 MHz – 2000 MHz<br>10Vrms/m<br>80 % AM, 1 kHz<br>unmodulated carrier;<br><br>2000 MHz – 2700 MHz<br>5 Vrms/m<br>80 % AM, 1 kHz<br>unmodulated carrier;<br><br>5100 MHz – 6000 MHz<br>3 Vrms/m<br>80 % AM, 1 kHz<br>unmodulated carrier | Criterion A                                                            |
| Conducted emissions                   | EN 50155:2021<br>EN 50121-3-2:2016/<br>A1:2019<br><br>IEC60571:2012<br>IEC 62236-3-2:2018 | 150 kHz – 500 kHz: 99 dB $\mu$ V quasi-peak<br>500 kHz – 30 MHz: 93 dB $\mu$ V quasi-peak                                                                                                                                                                                                                                  | Compliant with more<br>strict EN 55032<br>Class A                      |
| Radiated emissions                    | EN 50155:2021<br>EN 50121-3-2:2016/<br>A1:2019<br><br>IEC60571:2012<br>IEC 62236-3-2:2018 | 30 MHz – 230 MHz: 40 dB $\mu$ V/m<br>quasi-peak at 10 m<br><br>230 MHz – 1000 MHz: 47 dB $\mu$ V/m<br>quasi-peak at 10 m                                                                                                                                                                                                   | Class A required, but<br>compliant with more<br>strict Class B         |

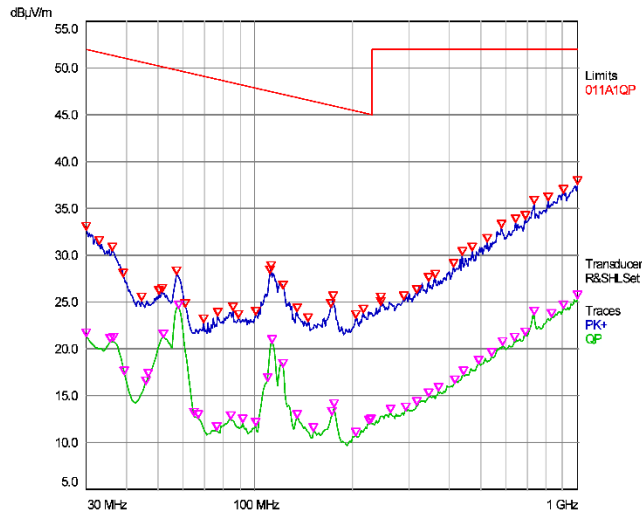
**Conducted emissions 150 kHz – 30 MHz @ 24 Vin**



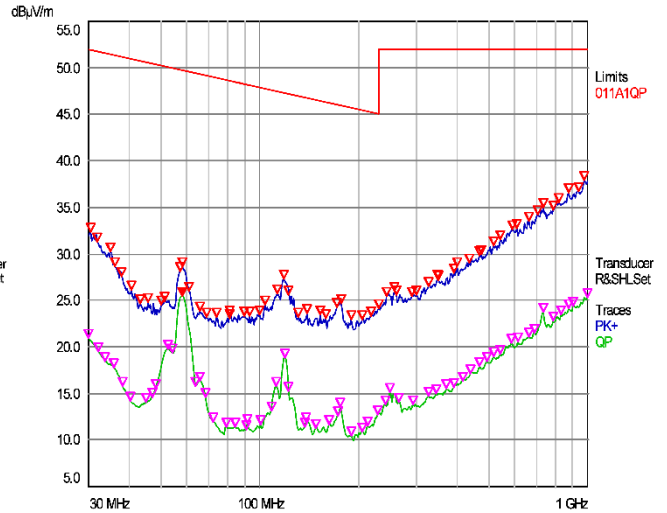
**Conducted emissions 150 kHz – 30 MHz @ 110 Vin**



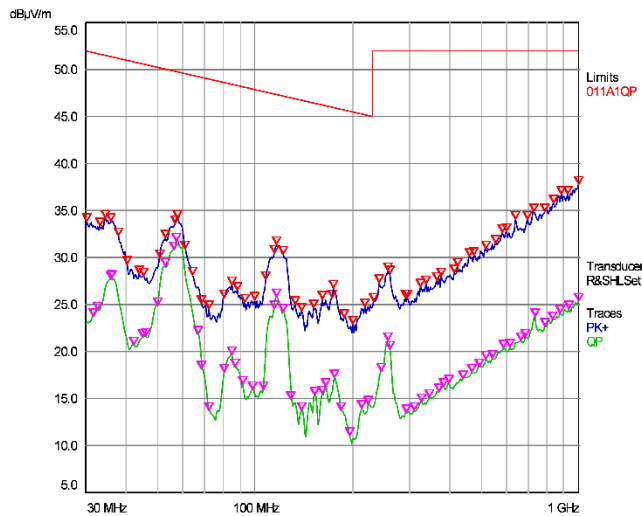
**Radiated emissions 30 – 1000 MHz @ 24 Vin  
vertical polarization**



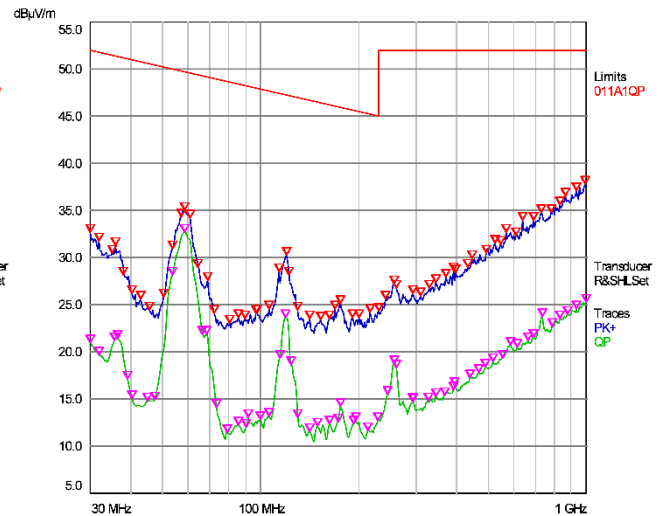
**Radiated emissions 30 – 1000 MHz @ 24 Vin  
horizontal polarization**



**Radiated emissions 30 – 1000 MHz @ 110 Vin  
vertical polarization**



**Radiated emissions 30 – 1000 MHz @ 110 Vin  
horizontal polarization**



## ENVIRONMENTAL CHARACTERISTICS

|                             |                                                                                                                                                                                                                                                                                                                          |
|-----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Operating Temperature       | <p>-50 °C – +85 °C</p> <p>@ 50 W-load, unit mounted on a aluminium baseplate with gap-pads:<br/>Class OT4: -40 – +70 °C and class ST1,ST2: +15 °C</p> <p>@ 36 W-load, unit mounted on a aluminium baseplate with gap-pads:<br/>Class OT6: -40 – +85 °C</p> <p>according to EN 50155:2021<br/>extended down to -50 °C</p> |
| Cooling                     | <p>Natural convection.</p> <p>Additionally for the open frame variants IC27X_2, two gap-pads can be used to improve heat dissipation to the outside environment (refer to section 'Mechanical Characteristics and Mounting').</p>                                                                                        |
| Storage Temperature Range   | -50 °C – +100 °C                                                                                                                                                                                                                                                                                                         |
| Altitude Class              | Class Ax (>1400 m) according to EN 50125-1:2014:<br>5000 m above sea level max.                                                                                                                                                                                                                                          |
| Pollution Degree            | PD2 according to EN 50124-1:2017                                                                                                                                                                                                                                                                                         |
| Shock and Vibration         | According to EN 61373:2010, category 1, class B                                                                                                                                                                                                                                                                          |
| Rapid Temperature Variation | <p>Class H2 according to EN 50155:2021:</p> <p>-25 °C to +15 °C/95 %RH, ±3 °C/s</p> <p>+10 °C to 40 °C/60 %RH, ±3 °C/s</p>                                                                                                                                                                                               |
| Protective Coating          | <p>Class PC2 according to EN 50155:2021</p> <p>The board is protected on both sides with a protective transparent fluorescent-pigment coating to prevent deterioration or damage due to moisture and atmospheric contaminants.</p> <p>The coating is compliant with class 2, according to IPC-A-610H</p>                 |
| Prohibited Substances       | <p>No substances defined as Prohibited according to the RoHS, REACH, UNIFE (RISL), or Prohibited for the Project, are present.</p> <p>No substances defined as Declarable according to RoHS, REACH, UNIFE (RISL), or Declarable for the Project, are present.</p>                                                        |
| Fire behaviour              | <p>EN 45545-2:2020+A1:2023<br/>compliant with all Hazard Levels HL1-HL3</p> <p>NFPA 130:2023</p>                                                                                                                                                                                                                         |

## GENERAL CHARACTERISTICS

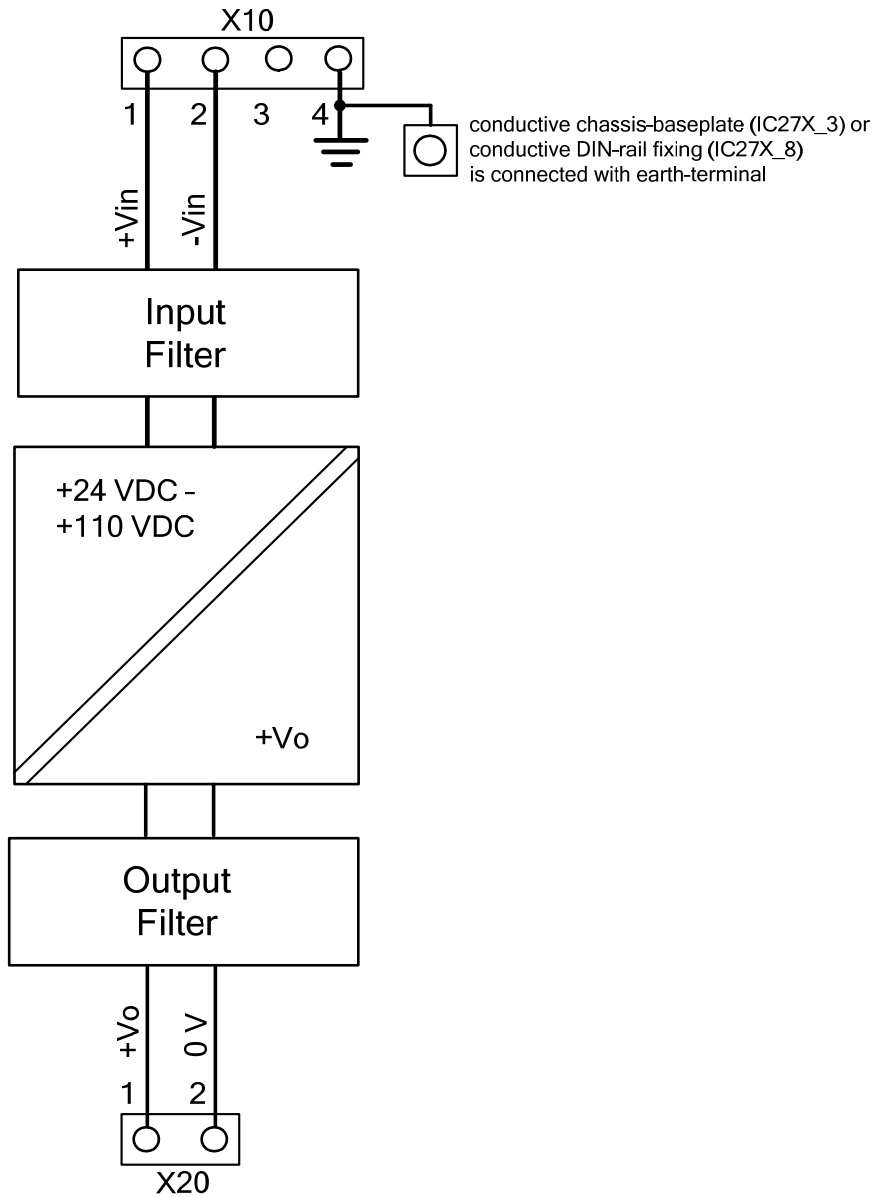
|                                                                                               |                                                                                                                                                                                                     |                            |                           |                            |
|-----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|---------------------------|----------------------------|
| General Standard                                                                              | EN 50155:2021<br>Railway applications - Rolling stock - Electronic equipment<br>IEC 60571:2012<br>Railway applications - Electronic equipment used on rolling stock                                 |                            |                           |                            |
| Useful Life Class                                                                             | Class L4 (20 years) according to EN 50155:2021                                                                                                                                                      |                            |                           |                            |
| MTBF<br>Calculation method: MIL-HDBK-217-F2<br>Using demonstrated Failure Rates of components | Ground Benign (GB), +25 °C                                                                                                                                                                          | Ground Benign (GB), +40 °C | Ground Fixed (GF), +40 °C | Ground Mobile (GM), +40 °C |
|                                                                                               | 14 085 000 h                                                                                                                                                                                        | 9 758 000 h                | 2 214 000 h               | 1 045 000 h                |
| MTBF<br>Calculation method: SN 29500 (IEC 61709)                                              | 2 347 000 h @ +50 °C                                                                                                                                                                                |                            |                           |                            |
| Marking                                                                                       | Label with following information:<br>- part number, output voltage, output power<br>- serial number for identification and traceability (printed in text format and as barcode)<br>- revision index |                            |                           |                            |
| Connector identification                                                                      | IC27X_2, IC27X_7:<br>printings on PCB to identify connectors and pin 1.<br>IC27X_3, IC27X_8:<br>printings on chassis to identify connectors and pin-functions.                                      |                            |                           |                            |

## SAFETY AND INSULATION

|                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Safety Standards                  | IEC 62368-1:2023<br>EN IEC 62368-1:2024/A11:2024                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Insulation Coordination           | According to EN 50124-1:2017                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Input, Output, Chassis            | <p>The input is galvanically isolated to the output.<br/>Input and output are galvanically isolated to the base-plate (or chassis).</p> <p>IC27X_2, IC27X_7: for the open frame variants, the isolation characteristics are ensured only if mounted according to section 'Mechanical Characteristics and Mounting'.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Input to Output                   | <p>Isolation Voltage: 3300 Vrms at 2000 m altitude, 60 s<br/>2500 Vrms at 5000 m altitude, 60 s<br/>Clearance: 5.5 mm<br/>Creepage: 5.5 mm</p> <p>For the type test, the Y-capacitors must be removed according to EN 61287-1:2014. Please refer to the intreXis whitepaper "Insulation Test" for detailed information.</p> <p>For the routine test according to EN 50124-1:2017 of Input to Output and Input to Chassis, intreXis AG recommends the following procedure: connect Output to Chassis, apply a test-voltage of 2125 VDC or 1500 VAC with trigger threshold <math>\geq 10</math> mA), 10 s between Input and Chassis. For this test, the Y-capacitors must not be removed. Please refer to the intreXis whitepaper "Insulation Test" for detailed information.</p> |
| Input to Base-plate (or Chassis)  | <p>Isolation Voltage: 1500 Vrms, 60 s<br/>Clearance: 2.5 mm<br/>Creepage: 2.5 mm</p> <p>For the routine test, see above.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Output to Base-plate (or Chassis) | <p>Isolation Voltage: 1000 Vrms, 60 s<br/>Clearance: 1.6 mm<br/>Creepage: 1.6 mm</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Insulation Resistance             | <p>Input-Chassis: &gt; 550 M<math>\Omega</math><br/>Input-Output: &gt; 550 M<math>\Omega</math><br/>Output-Chassis: &gt; 550 M<math>\Omega</math></p> <p>Test-voltage: 500 VDC</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

## BLOCK DIAGRAM

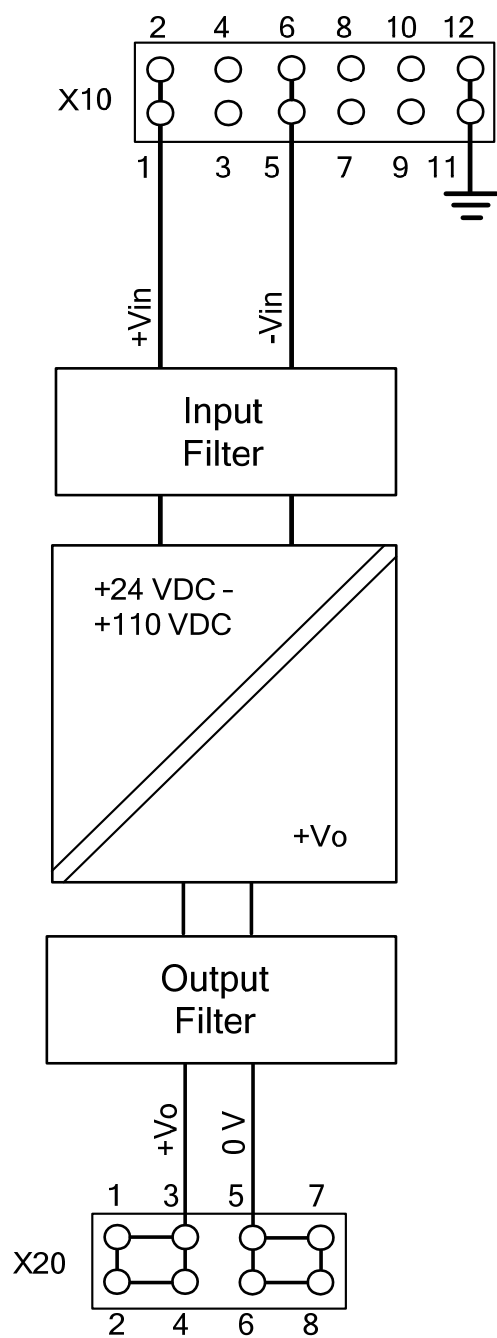
IC27X\_2, IC27X\_3, IC27X\_8:



Notes:

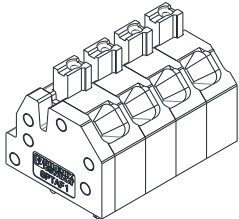
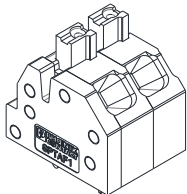
- conductive chassis-baseplate only for IC27X\_3
- conductive DIN-rail fixing only for IC27X\_8

IC27X\_7:



## CONNECTOR TYPES

### IC271\_2, IC272\_2, IC273\_2 (open frame, with push-in connectors)

|                                        |                                                                                                                                                                                                                                                                          |
|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>Input connector<br/>X10</b></p>  | <p>Phoenix SPTAF 1/ 4-3,5-EL or equivalent<br/>Pitch: 3.5 mm<br/>Number of pins: 4</p> <p>Push-in spring connection for wire-size of 1.5 mm<sup>2</sup> max. Strip length: 8 mm.</p>    |
| <p><b>Output connector<br/>X20</b></p> | <p>Phoenix SPTAF 1/ 2-3,5-EL or equivalent<br/>Pitch: 3.5 mm<br/>Number of pins: 2</p> <p>Push-in spring connection for wire-size of 1.5 mm<sup>2</sup> max. Strip length: 8 mm.</p>  |

## IC271\_3, IC272\_3, IC273\_3

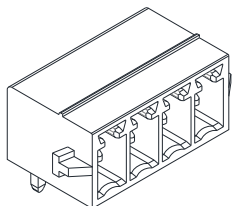
(standard Chassis Mount, with terminal block headers)

## IC271\_8, IC272\_8, IC273\_8

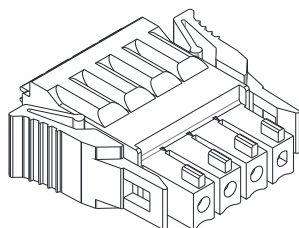
(DIN-rail Mount, with terminal block headers)

### Input connector X10

Phoenix MC 1,5/ 4-G-3,5-RN or equivalent  
Pitch: 3.5 mm  
Number of pins: 4

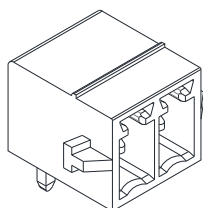


Mating part: Phoenix FMC 1,5/ 4-ST-3,5-RF, Ordering code: 1952047

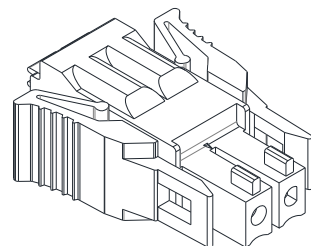


### Output connector X20

Phoenix MC 1,5/ 2-G-3,5-RN or equivalent  
Pitch: 3.5 mm  
Number of pins: 2



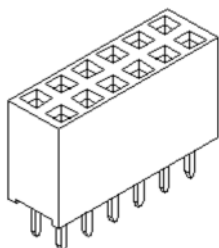
Mating part: Phoenix FMC 1,5/ 2-ST-3,5-RF, Ordering code: 1952021



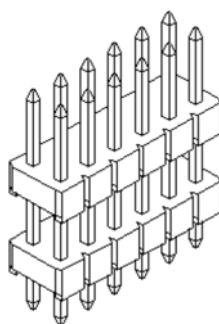
# IC271\_7, IC272\_7, IC273\_7 (open frame, PCB Mount)

## **Input connector X10**

GCT BG150-12-A-0320-N-D  
Pitch: 2.54 mm  
Number of pins: 12 (2 rows of 6 pins)

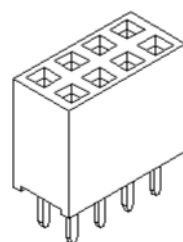


Mating part: GCT BG025-12-A-0600-0300-0900-N-G or equivalent

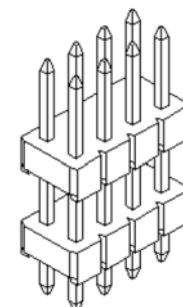


## **Output connector X20**

GCT BG150-08-A-0320-N-D  
Pitch: 2.54 mm  
Number of pins: 8 (2 rows of 4 pins)



Mating part: GCT BG025-08-A-0600-0300-0900-N-G or equivalent

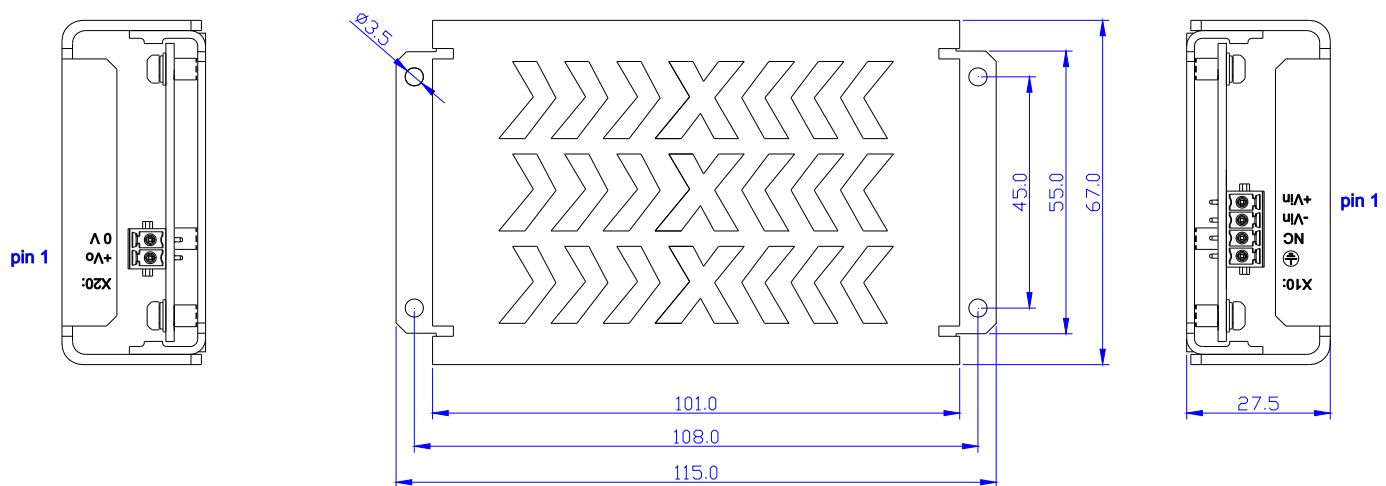


## MECHANICAL CHARACTERISTICS AND MOUNTING

|                                                                         |                                                                                                                                                                                                      |
|-------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Chassis<br>(not applicable for open-frame variants<br>IC27X_2, IC27X_7) | Aluminium: EN AW 5052 - AL5052 - AlMg2.5 or<br>EN AW 5754 - AL5754 - AlMg3<br><br>IC27X_3: Baseplate: blank<br>Cover: black anodized<br><br>IC27X_8: DIN-rail fixing: blank<br>Cover: black anodized |
| Overall dimensions                                                      | According to the drawings<br>(millimeters, unless otherwise specified)                                                                                                                               |
| Weight                                                                  | IC27X_2, IC27X_7: 98 g<br>IC27X_3: 181 g<br>IC27X_8: 230 g                                                                                                                                           |
| IP code                                                                 | IC27X_2, IC27X_7: IP00<br>IC27X_3, IC27X_8: IP20                                                                                                                                                     |
| Mounting                                                                | Mounting in any position is allowed                                                                                                                                                                  |

Mechanical drawings:

IC271\_3, IC272\_3, IC273\_3 (standard Chassis Mount)



Output connector X20:

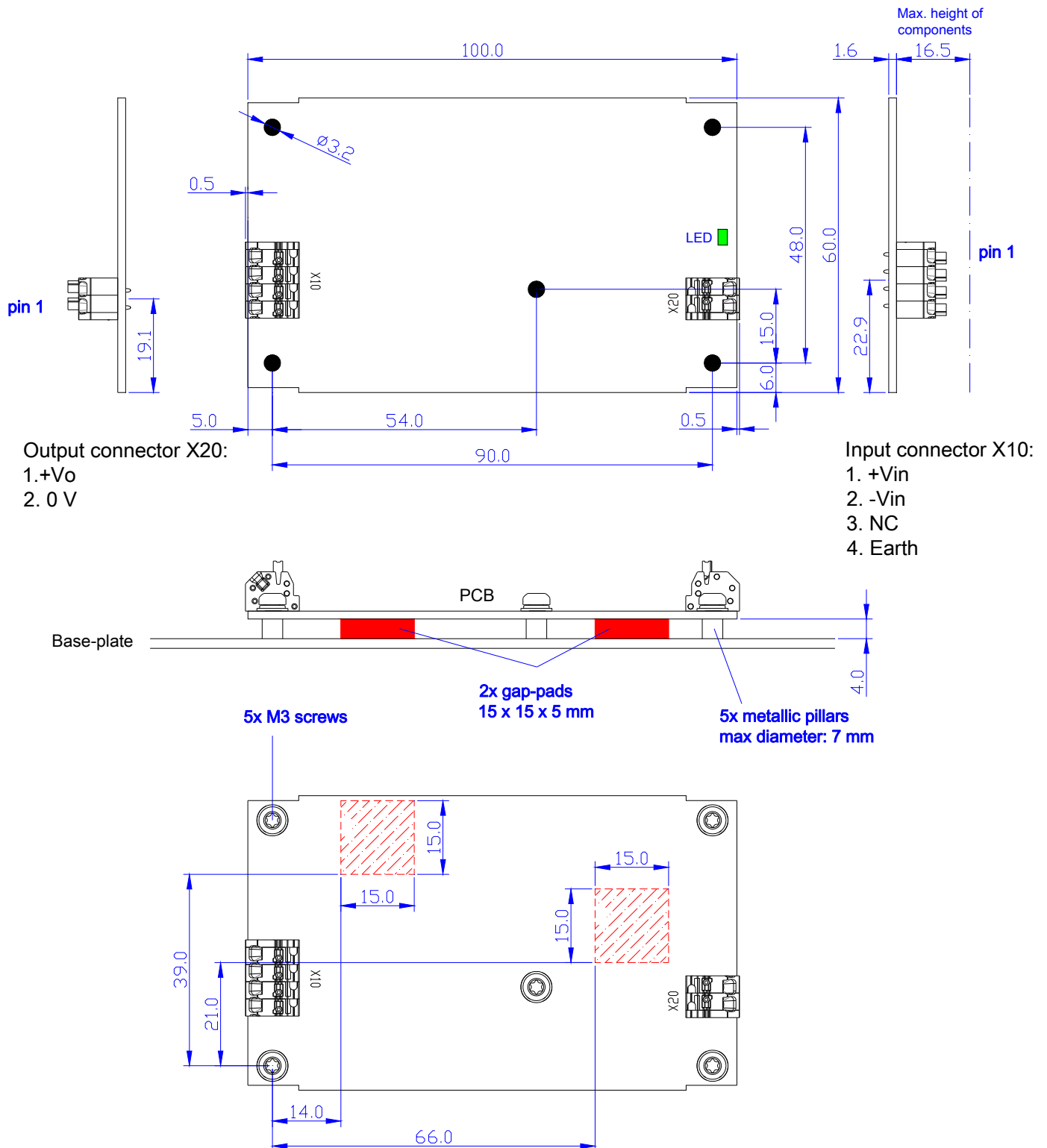
1. +Vo
2. 0 V

Input connector X10:

1. +Vin
2. -Vin
3. NC
4. Earth

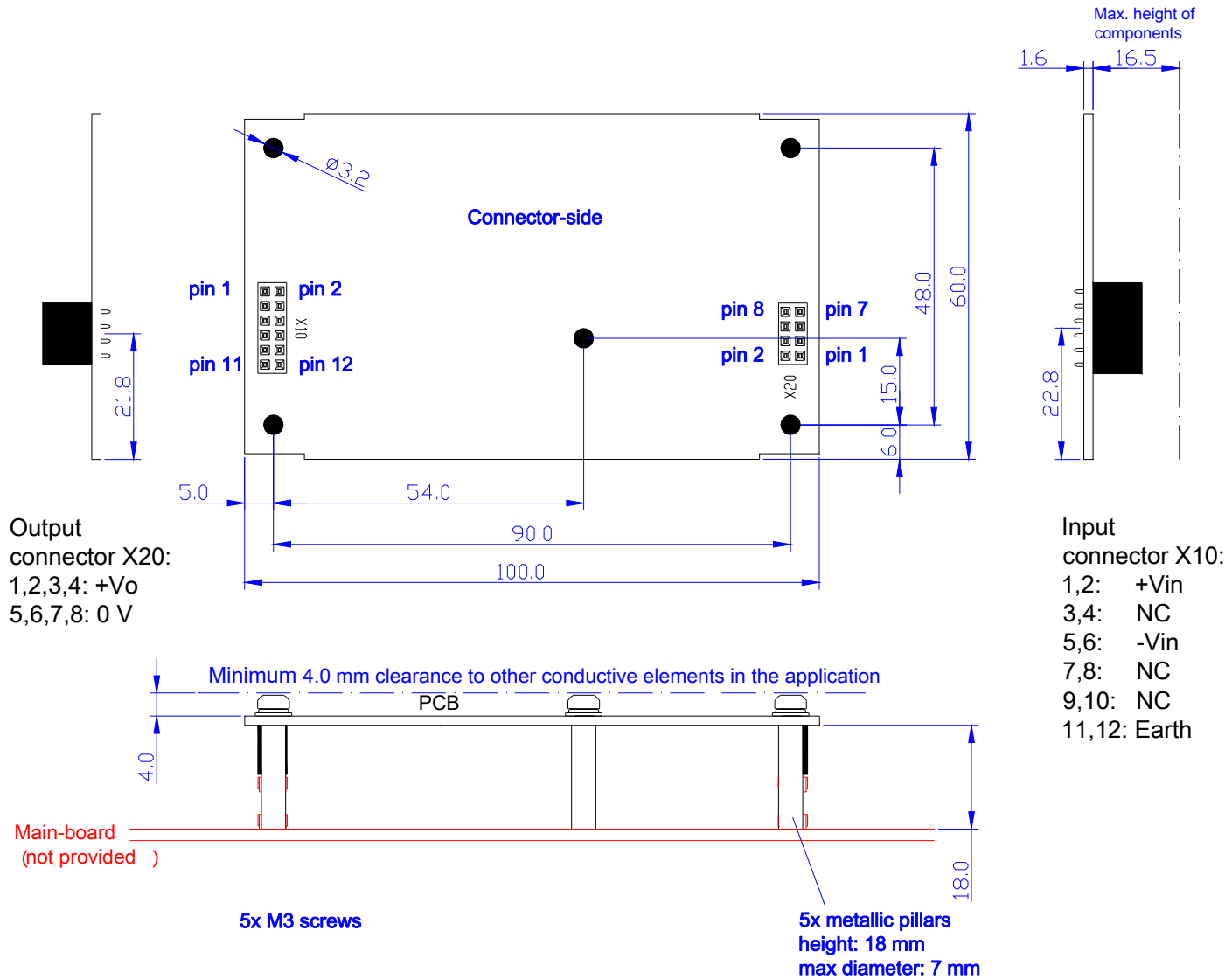
The unit must be secured using four M3 screws or bolts (not supplied) in the mounting holes.

## IC271\_2, IC272\_2, IC273\_2 (open frame, with push-in connectors)



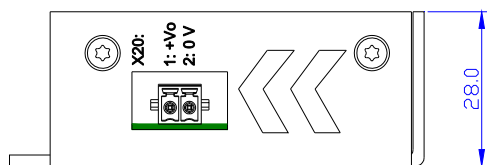
On the board, five mounting holes are provided to fix the units over pillars, using five M3 screws (pillars and screws not supplied). The pillars must be selected to ensure 4 mm gap between the base-plate and the PCB, as shown in the drawing. Longer pillars can be used, if no gap-pads are used (see below).

# IC271\_7, IC272\_7, IC273\_7 (open frame, PCB Mount)



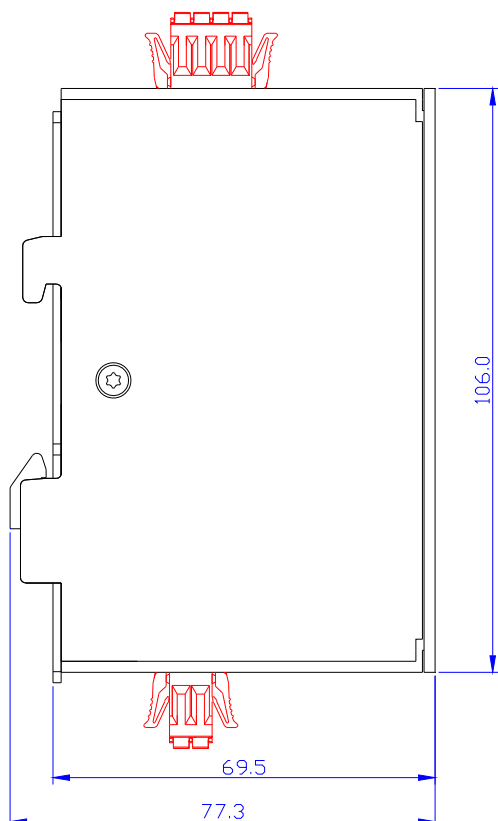
Parts colored in red are mating connectors, that are not provided and are shown for illustration purpose only.

## IC271\_8, IC272\_8, IC273\_8 (DIN-rail Mount)



Output connector X20:

1. +Vo
2. 0 V



Input connector X10:

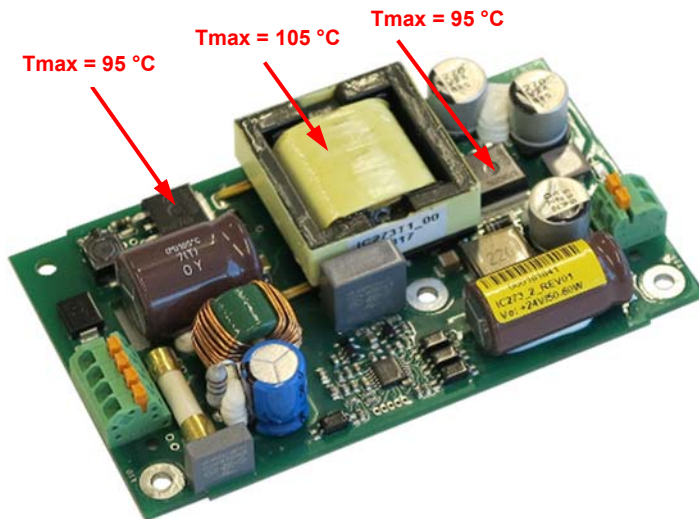
1. +Vin
2. -Vin
3. NC
4. Earth

Parts colored in red are mating connectors, that are not provided and are shown for illustration purpose only.

**Gap-pads for cooling (only open frame versions):**

For most applications which don't have a continuous load of 50 W on the output, the gap-pads are not necessary and conductive cooling is sufficient.

If the temperatures of the 3 components indicated in the drawing below are not exceeded at maximum ambient temperature and maximum continuous load of the application, gap-pads are not needed.



The gap-pads are only necessary for applications where it is desired to conduct as much heat as possible to the outside, to keep the internal chassis-temperature as low as possible (for instance closed chassis with other heat sources), or for applications which need the maximum continuous output power at the maximum ambient temperature. In these cases, two thermally-conductive gap-pads can be positioned under the PCB as specified in the drawing to allow heat transfer to the base-plate.

The gap-pads must be ordered separately from intreXis AG, ordering code: ***gappad\_15x15x5***.

The base-plate must be thermally conductive (e.g. steel or aluminium).

## TEST COMPLIANCE SUMMARY (CERTIFICATE OF CONFORMITY)

| Performed Test                                   | Standard                                                                              | Test conditions                                                                                                                                                                                                                                      | Performance level                                                                                                       | Reference document                         |
|--------------------------------------------------|---------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|
| Visual inspection                                | EN 50155:2021<br>IEC60571:2012                                                        | Aspect, dimensions, weight, markings                                                                                                                                                                                                                 | According to design specification                                                                                       | Test report                                |
| Performance test                                 | EN 50155:2021<br>IEC60571:2012                                                        | Ambient temperature.<br>Nominal supply voltage:<br>24 VDC and 110 VDC<br>Supply voltage range:<br>16.8 – 137.5 VDC (static)                                                                                                                          | Criterion A                                                                                                             | Test report                                |
| Power supply test<br>Supply overvoltages         | EN 50155:2021<br>IEC60571:2012                                                        | Supply voltage: 14.4–154 VDC 1s                                                                                                                                                                                                                      | Criterion B required,<br>but tested with more<br>strict criterion A                                                     | Test report                                |
| Insulation test                                  | EN 50155:2021<br>IEC60571:2012                                                        | Input–Chassis 500 VDC<br>Input– Output 500 VDC<br>Output – Chassis 500 VDC<br>Repeated after Voltage withstand test<br><br>Voltage withstand test:<br>Input–Chassis 1500 Vrms 60 s<br>Input– Output 3300 Vrms 60 s<br>Output– Chassis 1000 Vrms 60 s | Resistance > 20 MΩ<br>(measured<br>>550 MΩ, exceeding<br>the requirement)<br><br>No disruptive<br>discharge             | Test report                                |
| Low temperature start-up test<br>Cold start test | EN 50155:2021<br>IEC60571:2012                                                        | T = -50 °C                                                                                                                                                                                                                                           | Criterion A<br>(exceeds the<br>requirements,<br>extended range<br>down to -50 °C for<br>extremely cold<br>environments) | Test report                                |
| Dry heat test                                    | EN 50155:2021<br>IEC60571:2012                                                        | T = +85 °C (cycles B and C)                                                                                                                                                                                                                          | Criterion A                                                                                                             | Test report                                |
| Low temperature storage test                     | EN 50155:2021<br>IEC60571:2012                                                        | T = -50 °C                                                                                                                                                                                                                                           | Criterion A<br>after recovery period                                                                                    | Test report                                |
| Cyclic damp heat test                            | EN 50155:2021<br>IEC60571:2012                                                        | T = +55 °C and +25 °C<br>(2 cycles)                                                                                                                                                                                                                  | Criterion A                                                                                                             | Test report                                |
| EMC test                                         | EN 50155:2021<br>EN 50121-3-2:2016/<br>A1:2019<br>IEC60571:2012<br>IEC 62236-3-2:2018 | See section<br>'Electromagnetic Compatibility (EMC)'                                                                                                                                                                                                 |                                                                                                                         | Testreport_EMC<br>R-EM-354-0721-06A        |
| Vibration and shock test                         | EN 50155:2021<br>IEC60571:2012                                                        | EN 61373:2010, Category 1, class B                                                                                                                                                                                                                   |                                                                                                                         | Testreport_Vibrations<br>R-MC-354-0222-02A |

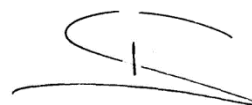
| Performed Test | Standard                                             | Test conditions                                                                                                                                                                       | Performance level       | Reference document                                |
|----------------|------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|---------------------------------------------------|
| Fire behaviour | EN 45545-2:2020                                      | PCB: R25<br>(EN 60695-2-11, T16:<br>No ignition at T=850 °C)                                                                                                                          | PASSED<br>(HL1-HL2-HL3) | Fire_Certificate_IC27X                            |
| Safety         | IEC 62368-1:2023<br>EN IEC 62368-1:2024/<br>A11:2024 | According to the standard:<br>Unit mounted on a aluminium baseplate<br>with gap-pads (see page 17),<br>certified for:<br>50 W-load @ Tambient = 70 °C<br>36 W-load @ Tambient = 85 °C | PASSED                  | Safety_<br>Certificate_IC271_2<br>AT-354-0126-01A |

Furthermore, the product is compliant with the requirements of:

- EC 1907/2006 (December, 18th 2006) REACH regulation: Registration, Evaluation, Authorisation and Restriction of Chemicals.
- UNIFE Railway Industry Substance List

Neuhausen am Rheinfall, 27.01.2026

Thomas Schiegg  
intreXis AG



# EU DECLARATION OF CONFORMITY (DoC)



|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                           |                                                                                                      |  |  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|--|--|
| Product Models                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | IC271_2, IC272_2, IC273_2; IC271_3, IC272_3, IC273_3;<br>IC271_7, IC272_7, IC273_7; IC271_8, IC272_8, IC273_8             |                                                                                                      |  |  |
| Name and address of the manufacturer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | intreXis AG<br>Tobelraastrasse 4<br>CH-8212 Neuhausen am Rheinfall<br>Switzerland                                         |                                                                                                      |  |  |
| This declaration of conformity is issued under the sole responsibility of the manufacturer.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                           |                                                                                                      |  |  |
| <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <p>IC271_2, IC272_2, IC273_2</p>  </div> <div style="text-align: center;"> <p>IC271_3, IC272_3, IC273_3</p>  </div> <div style="text-align: center;"> <p>IC271_7, IC272_7, IC273_7</p>  </div> <div style="text-align: center;"> <p>IC271_8, IC272_8, IC273_8</p>  </div> </div> |                                                                                                                           |                                                                                                      |  |  |
| The object of the declaration described above is in conformity with the relevant Union harmonisation legislation:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Low Voltage Directive:<br>RoHS Directive:<br>EMC Directive:                                                               | 2014/35/EU<br>2011/65/EU, (EU) 2015/863<br>2014/30/EU                                                |  |  |
| References to the relevant harmonised standards used or references to the other technical specifications in relation to which conformity is declared:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Low Voltage Directive:<br>RoHS Directive:<br>EMC Directive:<br>Railway Applications:                                      | EN IEC 62368-1:2024/<br>A11:2024<br>EN IEC 63000:2018<br>EN 50121-3-2:2016/ A1:2019<br>EN 50155:2021 |  |  |
| Signed for and on behalf of:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | intreXis AG<br>Tobelraastrasse 4<br>CH-8212 Neuhausen am Rheinfall<br>Switzerland                                         |                                                                                                      |  |  |
| Place, Date of issue                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Neuhausen am Rheinfall, 03.12.2025                                                                                        |                                                                                                      |  |  |
| Name, Function, Signature                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Thomas Schiegg, Managing Director:<br> |                                                                                                      |  |  |

## UK DECLARATION OF CONFORMITY (DoC)



|                                                                                                                                                                                                                  |                                                                                                                           |                                                                                                                                                                                                                                |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Product Models                                                                                                                                                                                                   | IC271_2, IC272_2, IC273_2; IC271_3, IC272_3, IC273_3;<br>IC271_7, IC272_7, IC273_7; IC271_8, IC272_8, IC273_8             |                                                                                                                                                                                                                                |
| Name and address of the manufacturer                                                                                                                                                                             | intreXis AG<br>Tobelraastrasse 4<br>CH-8212 Neuhausen am Rheinfall<br>Switzerland                                         |                                                                                                                                                                                                                                |
| This declaration of conformity is issued under the sole responsibility of the manufacturer.                                                                                                                      |                                                                                                                           |                                                                                                                                                                                                                                |
| <p>IC271_2, IC272_2, IC273_2      IC271_3, IC272_3, IC273_3      IC271_7, IC272_8, IC273_7      IC271_8, IC272_8, IC273_8</p>  |                                                                                                                           |                                                                                                                                                                                                                                |
| 2014/35/EU<br>2011/65/EU<br>2014/30/EU                                                                                                                                                                           | UK SI 2016 No. 1101:<br><br>UK SI 2012 No. 3032:<br><br>UK SI 2016 No. 1091:                                              | Electrical Equipment (Safety) Regulations 2016<br><br>The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012<br><br>Electromagnetic Compatibility Regulations 2016 |
| References to the relevant standards used or references to the other technical specifications in relation to which conformity is declared:                                                                       | Low Voltage Directive:<br><br>RoHS Directive:<br><br>EMC Directive:<br><br>Railway Applications:                          | BS EN IEC 62368-1:2024/A11:202<br><br>BS EN IEC 63000:2018<br><br>BS EN 50121-3-2:2016/A1:2019<br><br>BS EN 50155:2021                                                                                                         |
| Signed for and on behalf of:                                                                                                                                                                                     | intreXis AG<br>Tobelraastrasse 4<br>CH-8212 Neuhausen am Rheinfall<br>Switzerland                                         |                                                                                                                                                                                                                                |
| Place, Date of issue                                                                                                                                                                                             | Neuhausen am Rheinfall, 03.12.2025                                                                                        |                                                                                                                                                                                                                                |
| Name, Function, Signature                                                                                                                                                                                        | Thomas Schiegg, Managing Director:<br> |                                                                                                                                                                                                                                |

## INSTALLATION AND OPERATION

|                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Safety                | <div data-bbox="707 304 901 472" data-label="Image"> </div> <p data-bbox="924 309 1147 338">Warning / Caution!</p> <p data-bbox="924 369 1390 459">The power supplies should be installed and put into operation only by qualified personnel.</p> <p data-bbox="699 521 1420 582">Before installing or removing the unit, disconnect the power from the system.</p> <p data-bbox="699 613 1414 797">For 72 V and 110 V input applications, in addition to the main protective earthing terminal (X10/pin 4), a separate protective earthing terminal must be permanently connected to the conductive chassis-baseplate (IC27X_3) or to the conductive DIN-rail fixing (IC27X_8) or to the plated mounting holes, e.g. through pillars (IC27X_2).</p> |
| Servicing             | <p data-bbox="699 824 1420 1037">In case of failures, malfunctions or defects, the converter must be returned to intreXis for analysis and repair. In particular, the converter should be sent to intreXis for analysis if any damage has occurred to the unit (e.g. the unit dropped). Any attempts to open and repair the unit could void the warranty and could expose the operator to hazardous voltages.</p>                                                                                                                                                                                                                                                                                                                                    |
| Spare Parts           | <p data-bbox="699 1059 1406 1149">List and drawings of spare parts are not provided, since the failed units have to be returned to intreXis for analysis and repair.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Disposal              | <p data-bbox="699 1182 1420 1243">Disused units must be collected separately and disposed at a suitable recycling facility.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Connecting the Cables | <p data-bbox="699 1279 1369 1402">Ensure that proper wires are used according to the input current specifications.<br/>Prepare the cables according to the specifications of the particular connector used.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Operation of the Unit | <p data-bbox="699 1440 1331 1498">Once the input power is applied, the output voltage is enabled.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |